

IN THE CLAIMS

CLAIM 1 (Previously Presented) A spatial light modulator array for modulating light to form an image comprising:

a plurality of devices, each of which is disposed over a mirror which is disposed over a dielectric layer which is disposed over a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a reflector/absorber layer positioned and patterned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light;

said reflector/absorber layer having an edge overlapping an edge of said mirror to form an overlapping region to decrease ambient light from passing into said semiconductor substrate; and

said reflector/absorber layer comprises an anti-reflection surface.

CLAIM 2 (Original) The spatial light modulator array of claim 1 wherein said reflector/absorber layer overlaps said edge of said mirror by at least 5.4 μm .

CLAIM 3 (Currently Amended) A spatial light modulator array for modulating light to form an image comprising:

a plurality of devices, each of which is disposed over a mirror which is disposed over a dielectric layer which is disposed over a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a reflector/absorber layer positioned and patterned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light;

said reflector/absorber layer having an edge overlapping an edge of said mirror to form an overlapping region to decrease ambient light from passing into said semiconductor substrate; and

~~The spatial light modulator array of claim 1 wherein~~ said mirrors are formed from a metal layer wherein said metal is selected from the group consisting of Ag, Al and alloys thereof.

CLAIM 4 (Previously Presented) The spatial light modulator array of claim 1 wherein said mirrors have a supporting layer having a substantially planar upper surface and said mirrors include a respective metal layer for reflecting light, said respective metal layer is disposed on said substantially planar upper surface of said supporting layer.

CLAIM 5 (Original) The spatial light modulator array of claim 4 wherein said supporting layer includes dielectric material and electrical vias for electrical connection to said metal layer.

CLAIM 6 (Previously Presented) The spatial light modulator array of claim 1 wherein said plurality of liquid crystal devices have a thickness determined by a spacer dielectric layer, said spacer dielectric layer has openings formed over said respective mirrors.

CLAIM 7 (Original) The spatial light modulator array of claim 6 wherein said dielectric layer includes material is selected from the group consisting of SiO_2 , Si_3N_4 , diamond-like carbon, and polyamide.

CLAIM 8 (Original) The spatial light modulator array of claim 6 wherein said respective mirrors form the lower electrode of said plurality of liquid crystal devices and being electrically coupled to respective outputs of said plurality of electrical circuits.

CLAIM 9 (Original) The spatial light modulator array of claim 1 wherein said reflector/absorber layer is selected from the group consisting of Al, Cr- Cr_xO_y , Ti and TiN and TiN_xCy where.

CLAIM 10 (Original) The spatial light modulator array of claim 1 wherein said reflector/absorber layer is electrically conductive and forms a blanket layer over said semiconductor substrate with openings therein for electrical vias to said mirrors.

CLAIM 11 (Original) The spatial light modulator array of claim 1 wherein said electrical circuits include complementary metal oxide silicon (CMOS) circuits.

CLAIM 12 (Original) The spatial light modulator array of claim 1 wherein each of said mirrors and said reflector/absorber layer forms a capacitor of at least 0.03 pf.

CLAIM 13 (Original) The spatial light modulator array of claim 1 wherein said liquid crystal devices are positioned in rows and columns on a pitch in each of two directions of about 17 microns or less.

CLAIM 14 (Currently Amended) A method of forming a spatial light modulator array comprising the steps of:

forming a plurality of electrical circuits in a semiconductor substrate positioned for interconnecting with subsequently formed liquid crystal devices, respectively,

forming one or more layers of interconnections above said plurality of electrical circuits,

forming a first dielectric layer over said electrical circuits and said layers of interconnections,

planarizing said first dielectric layer to provide a ~~substantially~~ substantially planar upper surface on said first dielectric layer,

forming a reflector/absorber layer of ~~conductive~~ conductive material, positioned and patterned with respect to subsequently formed liquid crystal devices for shielding said plurality of electrical circuits from ambient light,

forming a second dielectric layer above said patterned reflector/absorber layer,

forming studs through said second dielectric layer for electrical connection to subsequently formed mirrors,

forming a plurality of mirrors over said dielectric layer and patterned to form the lower electrode of said plurality of liquid crystal devices, said mirrors overlapping said reflector/absorber layer to form a capacitor with

respect to said mirrors and to attenuate light traveling between said reflect/absorber and said mirrors,

forming a plurality of spacers positioned in between selected mirrors of said plurality of mirrors,

applying a layer of liquid crystal material,

orienting said layer of liquid crystal material, and

forming a top electrode of said plurality of mirrors to form said plurality of liquid crystal devices.

CLAIMS 15-45 (Canceled).

CLAIM 46 (Previously Presented) A spatial light modulator according to claim 1, wherein said reflector/absorber layer substantially prevents light from reaching said semiconductor substrate.

CLAIM 47 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector formed and a frame;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film is formed;

a layer of liquid crystal material positioned between said first and second orientation films; and

a substantially nonconductive optical blocking means positioned between said first electrode and said switching element for blocking an incident light from leaking into said switching element;

said substantially nonconductive optical blocking means comprises an anti-reflection surface.

CLAIM 48 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

----- a substrate; -----

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector formed and a frame;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film is formed;

a layer of liquid crystal material positioned between said first and second orientation films; and

a substantially nonconductive optical blocking means positioned between said first electrode and said switching element for blocking an incident light from leaking into said switching element;

said substantially nonconductive optical blocking means comprises an anti-reflection surface.

CLAIM 49 (Previously Presented) The apparatus of claim 47, wherein said optical blocking layer is formed of germanium oxide.

CLAIM 50 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a frame composition disposed along an edge of said first electrode, with said frame composition being composed of optical blocking insulating material for blocking incident light from leaking into said switching element;

said optical blocking material comprises an anti-reflection surface;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film formed; and

a layer of liquid crystal material positioned between said first and second orientation films.

CLAIM 51 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a frame composition disposed along an edge of said first electrode, with said frame composition being composed of optical blocking insulating material for blocking incident light from leaking into said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film formed;

a layer of liquid crystal material positioned between said first and second orientation films; and

said optical blocking material is cadmium telluride.

CLAIM 52 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a frame composition disposed along an edge of said first electrode, with said frame composition being composed of optical blocking insulating material for blocking incident light from leaking into said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

~~a second orientation film spaced apart from said first orientation film;~~

a second transparent electrode on which said second orientation film formed;

a layer of liquid crystal material positioned between said first and second orientation films; and

said optical blocking material is germanium oxide.

CLAIM 53 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

nonconductive optical blocking material formed under said first electrode;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode formed on said second orientation film;
and

a layer of liquid crystal material positioned between said first and second orientation films.

CLAIM 54 (Previously Presented) The apparatus of claim 53, wherein said optical blocking material is cadmium telluride.

CLAIM 55 (Previously Presented) The apparatus of claim 53, wherein said optical blocking material is germanium oxide.

CLAIM 56 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of circuit elements being formed on said substrate;

a first electrode connected with said circuit element and positioned over said circuit element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

~~a second transparent electrode on which said second orientation film is~~
formed;

an oriented layer of liquid crystal material disposed between said first and second electrodes;

optical blocking means positioned between said first electrode and said circuit element for blocking an incident light from leaking into said circuit element; and

said optical blocking means comprises an anti-reflection surface.

CLAIM 57 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of circuit elements being formed on said substrate;

a first electrode connected with said circuit element and positioned over said circuit element;

a frame disposed along the edge of said first electrode, with said frame comprising an optical blocking material for blocking incident light from leaking into said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode;

an oriented layer of liquid crystal material positioned between said first and second electrodes; and

said optical blocking means comprises an anti-reflection surface.

CLAIM 58 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of circuit elements being formed on said substrate;

a first electrode connected with said circuit element and positioned over said circuit element;

optical blocking means formed under said first electrode;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode;

an oriented layer of liquid crystal material positioned between said first and second electrodes; and

said optical blocking means comprises an anti-reflection surface.

CLAIM 59 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a second transparent electrode on which said second orientation film is formed;

an oriented layer of liquid crystal material positioned between said first and second electrodes;

substantially nonconductive optical blocking means positioned between said first electrode and said switching element for blocking an incident light from leaking into said switching element; and

said optical blocking means comprises an anti-reflection surface.

CLAIM 60 (Currently Amended) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a frame disposed along an edge of said first electrode, with said frame comprising an optical blocking insulating material for blocking incident light from leaking into said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a second transparent electrode on which said second orientation film formed;

an oriented layer of liquid crystal material positioned between said first and second electrodes; and

said optical blocking material comprises an ~~antireflection~~ anti-reflection surface coating.

CLAIM 61 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

nonconductive optical blocking material formed under said first electrode;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector formed on said first electrode;

a second transparent electrode on which said second orientation film is formed;

an oriented layer of liquid crystal material positioned between said first and second electrodes.

~~CLAIM 62 (Currently Amended) A spatial light modulator array for modulating light to form an image comprising:~~

~~a plurality of liquid crystal devices positioned over respective mirrors on a dielectric layer on a semiconductor substrate;~~

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

an absorber layer positioned and patterned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light;

said absorber layer having an edge overlapping an edge of said mirror to form an overlapping region to decrease ambient light from passing into said semiconductor substrate; and

said absorber layer comprises an ~~antireflection~~ anti-reflection ~~surface~~ coating.

CLAIM 63 (Currently Amended) A spatial light modulator array for modulating light to form an image comprising:

a plurality of liquid crystal devices positioned over respective mirrors on a dielectric layer on a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a reflector layer positioned and patterned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light;

said reflector layer having an edge overlapping an edge of said mirror to form an overlapping region to decrease ambient light from passing into said semiconductor substrate; and

said reflector layer comprises an ~~antireflection~~ anti-reflection surface coating.

CLAIM 64 (Currently Amended) A method of forming a spatial light modulator array comprising the steps of:

forming a plurality of electrical circuits in a semiconductor substrate positioned for interconnecting with subsequently formed liquid crystal devices, respectfully;

forming one or more layers of interconnections above said plurality of electrical circuits;

forming a first dielectric layer over said electrical circuits and said layers of interconnections;

planarizing said first dielectric layer to provide a substantially planar upper surface on said first dielectric layer;

forming an absorber layer, positioned and patterned with respect to subsequently formed liquid crystal devices for shielding said plurality of electrical circuits from ambient light,

----- forming a second dielectric layer above said patterned absorber layer; -----

forming studs through said second dielectric layer for electrical connection to subsequently formed mirrors;

forming a plurality of mirrors over said dielectric layer and patterned to form the lower electrode of said plurality of liquid crystal devices, said mirrors overlapping said absorber layer to form a capacitor with respect to

said overlapping mirror and to attenuate light traveling between said absorber and said mirror;

forming plurality of spacers positioned in between selected mirrors of said plurality of mirrors;

applying a layer of liquid crystal material;

orienting said layer of liquid crystal material;

forming a top electrode of said plurality of mirrors to form said plurality of liquid crystal devices; and

said absorber layer comprises an ~~antireflection~~ anti-reflection ~~surface~~ coating.

CLAIM 65 (Previously Presented) A method of forming a spatial light modulator array comprising the steps of:

forming a plurality of electrical circuits in a semiconductor substrate positioned for interconnecting with subsequently formed liquid crystal devices, respectfully;

~~forming one or more layers of interconnections above said plurality of~~
electrical circuits;

forming a first dielectric layer over said electrical circuits and said layers of interconnections;

planarizing said first dielectric layer to provide a substantially planar upper surface on said first dielectric layer;

forming an reflective layer, positioned and patterned with respect to subsequently formed liquid crystal devices for shielding said plurality of electrical circuits from ambient light;

forming a second dielectric layer above said patterned reflective layer;

forming studs through said second dielectric layer for electrical connection to subsequently formed mirrors;

forming a plurality of mirrors over said dielectric layer and patterned to form the lower electrode of said plurality of liquid crystal devices;

said mirrors overlapping said reflective layer to form a capacitor with respect to said overlapping mirror and to attenuate light traveling between said reflective and said mirror;

forming plurality of spacers positioned in between selected mirrors of said plurality of mirrors;

applying a layer of liquid crystal material;

orienting said layer of liquid crystal material;

forming a top electrode of said plurality of mirrors to form said plurality of liquid crystal devices; and

said mirrors are formed from a metal layer wherein said metal is selected from the group consisting of Ag, Al and alloys thereof.

CLAIM 66 (Currently Amended) A liquid crystal display comprising:

a plurality of liquid crystal devices positioned over respective mirrors on a dielectric layer on a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a light blocking layer positioned and patterned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light;

said light blocking layer having an edge overlapping an edge of said mirror to form an overlapping region to decrease ambient light from passing into said semiconductor substrate; and

said light blocking layers comprising an ~~antireflection~~ anti-reflection surface coating.

CLAIM 67 (Currently Amended) A liquid crystal display comprising:

a plurality of liquid crystal devices positioned over respective mirrors on a dielectric layer on a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a light blocking region positioned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light;

said light blocking region being disposed between said mirrors to decrease ambient light from passing into said semiconductor substrate; and

said light blocking region comprising an ~~antireflection~~ anti-reflection ~~surface~~ coating.

CLAIM 68 (Currently Amended) A liquid crystal apparatus comprising:

a plurality of liquid crystal devices positioned over respective mirrors on a dielectric layer on a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a light blocking region positioned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light; and

said light blocking region comprising an ~~antireflection~~ anti-reflection ~~surface~~ coating.

CLAIM 69 (Currently Amended) A liquid crystal apparatus comprising:

a plurality of liquid crystal devices positioned over respective mirrors on substrate;

a plurality of electrical circuits formed in said substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a light blocking region positioned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light; and

said light blocking region comprising an ~~antireflection~~ anti-reflection ~~surfacee~~ coating.

CLAIM 70 (Currently Amended) A liquid crystal apparatus comprising:

a plurality of liquid crystal devices positioned on substrate,

a plurality of electrical circuits formed in said substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a light blocking region positioned between said liquid crystal devices for shielding said plurality of electrical circuits from ambient light; and

said light blocking region comprising an ~~antireflection~~ anti-reflection ~~surfacee~~ coating.

CLAIM 71 (Currently Amended) A display unit according to claims 73, 75 or 76, wherein said first substrate has an insulation layer between said reflection electrode and said shading layer to form a holding capacitor.

CLAIM 72 (Currently Amended) A display unit according to claims 73, 75 or 76, wherein said shading layer is comprised of a different material from said reflection electrodes.

CLAIM 73 (Previously Presented) A liquid crystal apparatus comprising:

a plurality of liquid crystal devices positioned on substrate,

a plurality of electrical circuits formed in said substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a light blocking region positioned between said liquid crystal devices for shielding said plurality of electrical circuits from ambient light; and

said reflection electrodes are comprised primarily of Al and said shading layer is comprised primarily of a material selected from the group consisting of Ti and TiN and $Ti N_{0.33} Co_{0.67}$.

CLAIM 74 (Currently Amended) A display unit according to claims 73, 75 or 76, wherein said shading layer reflects light to a different direction from said reflection electrodes to exhibit a different reflection characteristic.

CLAIM 75 (Previously Presented) A liquid crystal apparatus comprising:

a plurality of liquid crystal devices positioned on substrate,

~~a plurality of electrical circuits formed in said substrate coupled to said~~
liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a light blocking region positioned between said liquid crystal devices for shielding said plurality of electrical circuits from ambient light; and

said reflection electrodes are selected from the group consisting of aluminum and an aluminum alloy.

CLAIM 76 (Previously Presented) A display unit according to claim 75, wherein said shading layer is comprised primarily of a material selected from the group consisting of Ti and TiN and $Ti_{0.33}Co_{0.67}$.

CLAIM 77 (Currently Amended) A display unit comprising:

a first substrate comprising a plurality of reflection electrodes with a gap portion formed therebetween, a second substrate opposing said first substrate having a transparent electrode, and a liquid crystal material being put between said first and said second substrates, wherein said first substrate has a shading layer at at least part of said gap portion and wherein said shading layer exhibits a different reflection characteristic from said reflection electrodes, said shading layer comprises an ~~antireflection~~ anti-reflection ~~surface~~ coating.

CLAIM 78 (Previously Presented) A spatial light modulator array for modulating light to form an image comprising:

a plurality of devices, each of which is disposed over a mirror which is disposed over a dielectric layer which is disposed over a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a shielding layer positioned and patterned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light;

said shielding layer having an edge overlapping an edge of said mirror to form an overlapping region to decrease ambient light from passing into said semiconductor substrate; and

said shielding layer substantially prevents radiant energy incident on said shielding layer at a non-orthogonal angle from substantially passing into said semiconductor substrate.

CLAIM 79 (Previously Presented) A spatial light modulator array for modulating light to form an image comprising:

a plurality of devices, each of which is disposed over a mirror which is disposed over a dielectric layer which is disposed over a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a shielding layer positioned and patterned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light;

~~said shielding layer having an edge overlapping an edge of said mirror to form an overlapping region to decrease ambient light from passing into said semiconductor substrate;~~

said mirrors are formed from a metal layer wherein said metal is selected from the group consisting of Ag, Al and alloys thereof; and

said shielding layer substantially prevents radiant energy incident on said shielding at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 80 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector formed and a frame;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

~~a second transparent electrode on which said second orientation film is~~
formed;

a layer of liquid crystal material positioned between said first and second orientation films;

a substantially nonconductive optical blocking means positioned between said first electrode and said switching element for blocking an incident light from leaking into said switching element; and

said substantially nonconductive optical blocking means substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 81 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector formed and a frame;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film is formed;

a layer of liquid crystal material positioned between said first and second orientation films;

a substantially nonconductive optical blocking means positioned between said first electrode and said switching element for blocking an incident light from leaking into said switching element; and

said substantially nonconductive optical blocking means substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 82 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a frame composition disposed along an edge of said first electrode, with said frame composition being composed of optical blocking insulating material for blocking incident light from leaking into said switching element;

said optical blocking material substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film formed; and

a layer of liquid crystal material positioned between said first and second orientation films.

CLAIM 83 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned
-----over said switching element;

a frame composition disposed along an edge of said first electrode, with said frame composition being composed of optical blocking insulating material for blocking incident light from leaking into said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film formed;

a layer of liquid crystal material positioned between said first and second orientation films;

said optical blocking insulating material substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate; and

said optical blocking material is cadmium telluride.

CLAIM 84 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a frame composition disposed along an edge of said first electrode, with said frame composition being composed of optical blocking insulating material for blocking incident light from leaking into said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film formed;

a layer of liquid crystal material positioned between said first and second orientation films;

said optical blocking insulating material substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate; and

said optical blocking material is germanium oxide.

CLAIM 85 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

nonconductive optical blocking material formed under said first electrode;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode formed on said second orientation film;

~~a layer of liquid crystal material positioned between said first and second orientation films; and~~

said non conductive optical blocking material substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 86 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of circuit elements being formed on said substrate;

a first electrode connected with said circuit element and positioned over said circuit element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film is formed;

an oriented layer of liquid crystal material disposed between said first and second electrodes;

optical blocking means positioned between said first electrode and said circuit element for blocking an incident light from leaking into said circuit element; and

said optical blocking means substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 87 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of circuit elements being formed on said substrate;

a first electrode connected with said circuit element and positioned over said circuit element;

a frame disposed along the edge of said first electrode, with said frame comprising an optical blocking material for blocking incident light from leaking into said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

~~a first orientation film formed on said optical reflector;~~

a second orientation film spaced apart from said first orientation film;

a second transparent electrode;

an oriented layer of liquid crystal material positioned between said first and second electrodes; and

said optical blocking means substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 88 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of circuit elements being formed on said substrate;

a first electrode connected with said circuit element and positioned over said circuit element;

optical blocking means formed under said first electrode;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode;

an oriented layer of liquid crystal material positioned between said first and second electrodes; and

said optical blocking means substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 89 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a second transparent electrode on which said second orientation film is formed;

an oriented layer of liquid crystal material positioned between said first and second electrodes;

substantially nonconductive optical blocking means positioned between said first electrode and said switching element for blocking an incident light from leaking into said switching element; and

said optical blocking means substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 90 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a frame disposed along an edge of said first electrode, with said frame comprising an optical blocking insulating material for blocking incident light from leaking into said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a second transparent electrode on which said second orientation film formed;

an oriented layer of liquid crystal material positioned between said first and second electrodes; and

said optical blocking material substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 91 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

nonconductive optical blocking material formed under said first electrode;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector formed on said first electrode;

a second transparent electrode on which said second orientation film is formed;

an oriented layer of liquid crystal material positioned between said first and second electrodes; and

said non conductive optical blocking material substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 92 (Previously Presented) A spatial light modulator array for modulating light to form an image comprising:

a plurality of liquid crystal devices positioned over respective mirrors on a dielectric layer on a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

an absorber layer positioned and patterned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light;

said absorber layer having an edge overlapping an edge of said mirror to form an overlapping region to decrease ambient light from passing into said semiconductor substrate; and

said absorber layer substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 93 (Previously Presented) A spatial light modulator array for modulating light to form an image comprising:

a plurality of liquid crystal devices positioned over respective mirrors on a dielectric layer on a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a reflector layer positioned and patterned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light;

said reflector layer having an edge overlapping an edge of said mirror to form an overlapping region to decrease ambient light from passing into said semiconductor substrate; and

said reflector layer substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 94 (Previously Presented) A method of forming a spatial light modulator array comprising the steps of:

forming a plurality of electrical circuits in a semiconductor substrate positioned for interconnecting with subsequently formed liquid crystal devices, respectfully;

forming one or more layers of interconnections above said plurality of electrical circuits;

forming a first dielectric layer over said electrical circuits and said layers of interconnections;

planarizing said first dielectric layer to provide a substantially planar upper surface on said first dielectric layer;

forming an absorber layer, positioned and patterned with respect to subsequently formed liquid crystal devices for shielding said plurality of electrical circuits from ambient light,

forming a second dielectric layer above said patterned absorber layer;

forming studs through said second dielectric layer for electrical connection to subsequently formed mirrors;

forming a plurality of mirrors over said dielectric layer and patterned to form the lower electrode of said plurality of liquid crystal devices, said mirrors overlapping said absorber layer to form a capacitor with respect to said overlapping mirror and to attenuate light traveling between said absorber and said mirror;

forming plurality of spacers positioned in between selected mirrors of said plurality of mirrors;

applying a layer of liquid crystal material;

orienting said layer of liquid crystal material;

forming a top electrode of said plurality of mirrors to form said plurality of liquid crystal devices; and

said absorber layer substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 95 (Previously Presented) A method of forming a spatial light modulator array comprising the steps of:

forming a plurality of electrical circuits in a semiconductor substrate positioned for interconnecting with subsequently formed liquid crystal devices, respectfully;

forming one or more layers of interconnections above said plurality of electrical circuits;

forming a first dielectric layer over said electrical circuits and said layers of interconnections;

planarizing said first dielectric layer to provide a substantially planar upper surface on said first dielectric layer;

forming an reflective layer, positioned and patterned with respect to subsequently formed liquid crystal devices for shielding said plurality of electrical circuits from ambient light;

said reflective layer substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate;

forming a second dielectric layer above said patterned reflective layer;

forming studs through said second dielectric layer for electrical connection to subsequently formed mirrors;

~~forming a plurality of mirrors over said dielectric layer and patterned to form the lower electrode of said plurality of liquid crystal devices;~~

said mirrors overlapping said reflective layer to form a capacitor with respect to said overlapping mirror and to attenuate light traveling between said reflective and said mirror;

forming plurality of spacers positioned in between selected mirrors of said plurality of mirrors;

applying a layer of liquid crystal material;

orienting said layer of liquid crystal material;

forming a top electrode of said plurality of mirrors to form said plurality of liquid crystal devices; and

said mirrors are formed from a metal layer wherein said metal is selected from the group consisting of Ag, Al and alloys thereof.

CLAIM 96 (Previously Presented) A liquid crystal display comprising:

a plurality of liquid crystal devices positioned over respective mirrors on a dielectric layer on a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a light blocking layer positioned and patterned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light;

said light blocking layer having an edge overlapping an edge of said mirror to form an overlapping region to decrease ambient light from passing into said semiconductor substrate; and

said light blocking layers substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 97 (Previously Presented) A liquid crystal display comprising:

a plurality of liquid crystal devices positioned over respective mirrors on a dielectric layer on a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a light blocking region positioned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light;

said light blocking region being disposed between said mirrors to decrease ambient light from passing into said semiconductor substrate;
and

said light blocking region substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 98 (Previously Presented) A liquid crystal apparatus comprising:

a plurality of liquid crystal devices positioned over respective mirrors on a dielectric layer on a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a light blocking region positioned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light; and

said light blocking region substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 99 (Previously Presented) A liquid crystal apparatus comprising:

a plurality of liquid crystal devices positioned over respective mirrors on substrate;

a plurality of electrical circuits formed in said substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a light blocking region positioned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light; and

said light blocking region substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 100 (Previously Presented) A liquid crystal apparatus comprising:

a plurality of liquid crystal devices positioned on substrate,

a plurality of electrical circuits formed in said substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a light blocking region positioned between said liquid crystal devices for shielding said plurality of electrical circuits from ambient light; and

said light blocking region substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 101 (Previously Presented) A display unit according to anyone of claims 103, 105 or 107, wherein said first substrate has an insulation layer between said reflection electrode and said shading layer to form a holding capacitor.

CLAIM 102 (Previously Presented) A display unit according to anyone of claims 103, 105 or 107, wherein said shading layer is comprised of a different material from said reflection electrodes.

CLAIM 103 (Previously Presented) A liquid crystal apparatus comprising:

a plurality of liquid crystal devices positioned on substrate,

a plurality of electrical circuits formed in said substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a light blocking region positioned between said liquid crystal devices for shielding said plurality of electrical circuits from ambient light;

said light blocking region substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate; and

said reflection electrodes are comprised primarily of Al and said shading layer is comprised primarily of a material selected from the group consisting of Ti and TiN and $Ti N_{0.33} Co_{0.67}$.

CLAIM 104 (Previously Presented) A display unit according to anyone of claims 103, 105 or 107, wherein said shading layer reflects light to a different direction from said reflection electrodes to exhibit a different reflection characteristic.

CLAIM 105 (Previously Presented) A liquid crystal apparatus comprising:

a plurality of liquid crystal devices positioned on substrate,

a plurality of electrical circuits formed in said substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

----- a light blocking region positioned between said liquid crystal devices for shielding said plurality of electrical circuits from ambient light;

said light blocking region substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate; and

said reflection electrodes are selected from the group consisting of aluminum and an aluminum alloy.

CLAIM 106 (Previously Presented) A display unit according to claim 105, wherein said shading layer is comprised primarily of a material selected from the group consisting of Ti and TiN and $Ti N_{0.33} Co_{0.67}$.

CLAIM 107 (Previously Presented) A display unit comprising:

a first substrate comprising a plurality of reflection electrodes with a gap portion formed therebetween, a second substrate opposing said first substrate having a transparent electrode, and a liquid crystal material being put between said first and said second substrates, wherein said first substrate has a shading layer at at least part of said gap portion and wherein said shading layer exhibits a different reflection characteristic from said reflection electrodes, said shading layer substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 108 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film is formed;

a layer of liquid crystal material positioned between said first and second orientation films;

a substantially nonconductive optical blocking means positioned between said first electrode and said switching element for blocking an incident light from leaking into said switching element; and

said substantially nonconductive optical blocking means substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 109 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film is formed;

a layer of liquid crystal material positioned between said first and second orientation films;

a substantially nonconductive optical blocking means positioned between said first electrode and said switching element for blocking an incident light from leaking into said switching element; and

said substantially nonconductive optical blocking means substantially prevents radiant energy incident on said non conductive optical blocking layer at a non-orthogonal angle from passing into said semiconductor substrate.

CLAIM 110 (Previously Presented) A spatial light modulator array for modulating light to form an image comprising:

a plurality of devices, each of which is disposed over a mirror which is disposed over a dielectric layer which is disposed over a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a reflector/absorber layer positioned and patterned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light;

said reflector/absorber layer having an edge overlapping an edge of said mirror to form an overlapping region to decrease ambient light from passing into said semiconductor substrate.

CLAIM 111 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector formed and a frame;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film is formed;

a layer of liquid crystal material positioned between said first and second orientation films; and

a substantially nonconductive optical blocking means positioned between said first electrode and said switching element for blocking an incident light from leaking into said switching element.

CLAIM 112 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector formed and a frame;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film is formed;

a layer of liquid crystal material positioned between said first and second orientation films; and

a substantially nonconductive optical blocking means positioned between said first electrode and said switching element for blocking an incident light from leaking into said switching element.

CLAIM 113 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a frame composition disposed along an edge of said first electrode, with said frame composition being composed of optical blocking insulating material for blocking incident light from leaking into said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film formed; and

a layer of liquid crystal material positioned between said first and second orientation films.

CLAIM 114 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of circuit elements being formed on said substrate;

a first electrode connected with said circuit element and positioned over said circuit element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film is formed;

an oriented layer of liquid crystal material disposed between said first and second electrodes; and

optical blocking means positioned between said first electrode and said circuit element for blocking an incident light from leaking into said circuit element.

CLAIM 115 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of circuit elements being formed on said substrate;

a first electrode connected with said circuit element and positioned over said circuit element;

a frame disposed along the edge of said first electrode, with said frame comprising an optical blocking material for blocking incident light from leaking into said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode; and

an oriented layer of liquid crystal material positioned between said first and second electrodes.

CLAIM 116 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of circuit elements being formed on said substrate;

a first electrode connected with said circuit element and positioned over said circuit element;

optical blocking means formed under said first electrode;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode; and

an oriented layer of liquid crystal material positioned between said first and second electrodes.

CLAIM 117 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a second transparent electrode on which said second orientation film is formed;

an oriented layer of liquid crystal material positioned between said first and second electrodes; and

substantially nonconductive optical blocking means positioned between said first electrode and said switching element for blocking an incident light from leaking into said switching element.

CLAIM 118 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a frame disposed along an edge of said first electrode, with said frame comprising an optical blocking insulating material for blocking incident light from leaking into said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a second transparent electrode on which said second orientation film formed; and

an oriented layer of liquid crystal material positioned between said first and second electrodes.

CLAIM 119 (Previously Presented) A spatial light modulator array for modulating light to form an image comprising:

a plurality of liquid crystal devices positioned over respective mirrors on a dielectric layer on a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

an absorber layer positioned and patterned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light; and

said absorber layer having an edge overlapping an edge of said mirror to form an overlapping region to decrease ambient light from passing into said semiconductor substrate.

CLAIM 120 (Previously Presented) A spatial light modulator array for modulating light to form an image comprising:

a plurality of liquid crystal devices positioned over respective mirrors on a dielectric layer on a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a reflector layer positioned and patterned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light; and

said reflector layer having an edge overlapping an edge of said mirror to form an overlapping region to decrease ambient light from passing into said semiconductor substrate.

CLAIM 121 (Previously Presented) A method of forming a spatial light modulator array comprising the steps of:

forming a plurality of electrical circuits in a semiconductor substrate positioned for interconnecting with subsequently formed liquid crystal devices, respectfully;

forming one or more layers of interconnections above said plurality of electrical circuits;

forming a first dielectric layer over said electrical circuits and said layers of interconnections;

planarizing said first dielectric layer to provide a substantially planar upper surface on said first dielectric layer;

forming an absorber layer, positioned and patterned with respect to subsequently formed liquid crystal devices for shielding said plurality of electrical circuits from ambient light,

forming a second dielectric layer above said patterned absorber layer;

forming studs through said second dielectric layer for electrical connection to subsequently formed mirrors;

forming a plurality of mirrors over said dielectric layer and patterned to form the lower electrode of said plurality of liquid crystal devices, said mirrors overlapping said absorber layer to form a capacitor with respect to said overlapping mirror and to attenuate light traveling between said absorber and said mirror;

forming plurality of spacers positioned in between selected mirrors of said plurality of mirrors;

applying a layer of liquid crystal material;

orienting said layer of liquid crystal material; and

forming a top electrode of said plurality of mirrors to form said plurality of liquid crystal devices.

CLAIM 122 (Previously Presented) A liquid crystal display comprising:

a plurality of liquid crystal devices positioned over respective mirrors on a dielectric layer on a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a light blocking layer positioned and patterned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light; and

said light blocking layer having an edge overlapping an edge of said mirror to form an overlapping region to decrease ambient light from passing into said semiconductor substrate.

CLAIM 123 (Previously Presented) A liquid crystal display comprising:

a plurality of liquid crystal devices positioned over respective mirrors on a dielectric layer on a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices;

a light blocking region positioned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light; and

said light blocking region being disposed between said mirrors to decrease ambient light from passing into said semiconductor substrate.

CLAIM 124 (Previously Presented) A liquid crystal apparatus comprising:

a plurality of liquid crystal devices positioned over respective mirrors on a dielectric layer on a semiconductor substrate;

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices; and

a light blocking region positioned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light.

CLAIM 125 (Previously Presented) A liquid crystal apparatus comprising:

a plurality of liquid crystal devices positioned over respective mirrors on substrate;

a plurality of electrical circuits formed in said substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices; and

a light blocking region positioned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light.

CLAIM 126 (Previously Presented) A liquid crystal apparatus comprising:

a plurality of liquid crystal devices positioned on substrate,

a plurality of electrical circuits formed in said substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices; and

a light blocking region positioned between said liquid crystal devices for shielding said plurality of electrical circuits from ambient light.

CLAIM 127 (Previously Presented) A display unit comprising:

a first substrate comprising a plurality of reflection electrodes with a gap portion formed therebetween, a second substrate opposing said first substrate having a transparent electrode, and a liquid crystal material being put between said first and said second substrates, wherein said first substrate has a shading layer at at least part of said gap portion and wherein said shading layer exhibits a different reflection characteristic from said reflection electrodes.

CLAIM 128 (Previously Presented) A display unit according to claim 127, wherein said first substrate has an insulation layer between said reflection electrode and said shading layer to form a holding capacitor.

CLAIM 129 (Previously Presented) A display unit according to claim 127, wherein said shading layer is comprised of a different material from said reflection electrodes.

CLAIM 130 (Previously Presented) A display unit according to claim 127, wherein said shading layer reflects light to a different direction from said reflection electrodes to exhibit a different reflection characteristic.

CLAIM 131 (Previously Presented) A display unit according to claim 127, wherein said shading layer is comprised primarily of a material selected from the group consisting of Ti and TiN and $\text{Ti N}_{0.33} \text{Co}_{0.67}$.

CLAIM 132 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film is formed;

a layer of liquid crystal material positioned between said first and second orientation films; and

a substantially nonconductive optical blocking means positioned between said first electrode and said switching element for blocking an incident light from leaking into said switching element.

CLAIM 133 (Previously Presented) A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a storage capacitor electrically connected with said first electrode and positioned under said first electrode;

an optical reflector;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film is formed;

a layer of liquid crystal material positioned between said first and second orientation films; and

a substantially nonconductive optical blocking means positioned between said first electrode and said switching element for blocking an incident light from leaking into said switching element.